The road to becoming a healthcare professional is long. The journey often starts with undergraduate studies and culminates years later with a license or certification. Yet clinicians — and those helping them improve patient outcomes — must commit to ongoing training and education throughout their careers. As medical technology advances, so must the skills and capabilities of those delivering care. The result is better patient care.

Several studies show that physicians who are current in the latest technology and medical advances provide better care for their patients. For example, a 2010 study by the American College of Chest Physicians found that physicians who attended an educational program about chronic obstructive pulmonary disease were 50 percent more likely to make evidence-based decisions. Similarly, another study found that continuing medical education can save significant costs to healthcare systems when even just a few doctors change their practice as a result of what they learned.

Given its positive effect on healthcare, it’s easy to understand why healthcare administrators and clinicians place such a premium on advanced medical training and education. A 2011 survey of policy groups within the American Hospital Association found that medical knowledge was the second most valued competency for physicians within members’ organizations.

But keeping up with the latest scientific advances is no easy feat for healthcare professionals who have heavy workloads and scarce financial resources dedicated to continuing medical education. Perhaps even more challenging is the rate at which technology is changing what we know about the human body. A 2011 study estimated that medical knowledge will double every 73 days in 2020 as new tools become available to doctors, surgeons, nurses, and other healthcare professionals. Some of those tools are opening new frontiers in minimally invasive surgery, which is proven to improve patient outcomes and lower costs. Yet the techniques involved in minimally invasive surgery come with a steep learning curve and require extensive training.

**A 2011 STUDY ESTIMATED THAT MEDICAL KNOWLEDGE WILL DOUBLE EVERY 73 DAYS IN 2020.**

**INNOVATIVE TECHNOLOGY SPURS INNOVATIVE TRAINING**

At Medtronic, we recognize that healthcare systems function most effectively when the quality of the infrastructure is matched by the capacity, skills, and knowledge of its clinicians. It’s one of the reasons why Medtronic invests millions of dollars each year educating our healthcare partners around the world on the safe use of our medical devices and the comprehensive suite of our products. In 2019, we invested $142 million in capacity-building and...
training for medical professionals, reaching more than 83,000 people.6

Through education and training, Medtronic contributes to the collective knowledge of the healthcare ecosystem. In turn, we are helping clinicians improve patient outcomes, furthering health system efficiency, and expanding global access to care.

Our collaboration with healthcare partners is taking shape in a variety of ways that ultimately drive meaningful innovation — from conducting vital preclinical research to offering medical education and training at the company’s Innovation Centers, each strategically located around the globe.

With medical technology evolving at a staggering rate, Medtronic is in a unique position to offer education and training to healthcare professionals seeking to understand the latest technological advances such as robotic-assisted surgery, biosensors, imaging, and more.

Advances in technology are also changing how we train healthcare professionals. By using extended reality technologies, for example, Medtronic is offering immersive experiences and realistic scenarios for doctors treating life-threatening diseases.

OFFERING HANDS-ON MEDICAL EDUCATION AND TRAINING

To spur innovative solutions, Medtronic works with medical professionals, scientists, engineers, and leaders in academia to tackle some of the world’s most pressing healthcare challenges. Many times, our collaboration coalesces around preclinical testing to collect data to support advances in medical treatments. By supporting such work, Medtronic offers hands-on training to thousands of healthcare professionals each year at our state-of-the-art facilities on the safe and effective use of our products.

The epicenter of the company’s preclinical work in North America is our Physiological Research Laboratories (PRL) in Minnesota. Founded in 1973, PRL was the vision of Medtronic co-founder Earl Bakken, who wanted to

Neurosurgeon residents from several Midwestern medical schools get hands-on training on common spine procedures at PRL.

create a premier research and training facility. Some of the company’s signature products and therapies can be traced back to work done at PRL.

The key areas of focus at PRL include training and education, preclinical testing, and biomaterials. In 2019, more than 1,100 physicians, surgeons, and Medtronic employees were trained at the facility. Much of the training that occurs at PRL supports the company’s cardiovascular devices such as pacemakers, transcatheter valves, and defibrillators. Healthcare professionals who are trained at PRL have access to a clinical lab and seven operating rooms with sophisticated imaging tools and other equipment.

3 KEY FOCUS AREAS AT PRL

1. Preclinical testing
2. Biomaterials
3. Training

Physiological Research Laboratories (PRL)
“It always makes me smile when I hear physicians say how well-equipped our facility is,” said Ian Courtney, senior director and PRL’s site leader. “We strive for the highest standards in everything we do and that’s evident in our facility and our staff.”

GLOBAL TRAINING FOR IMPROVED PATIENT CARE

Outside the United States, Medtronic trains and educates healthcare professionals through our growing global network of Innovation Centers. These strategically located, state-of-the-art facilities provide world-class medical education while lending critical insights into the nuances that exist in healthcare delivery from one region to another. What patients and clinicians in India need, for example, may be different from what is needed in the Netherlands.

Our Innovation Centers are providing training in places where the need for such a service is the greatest. For example, when our new Innovation Center in Chengdu, China opens in 2020, it will serve healthcare professionals in a region of the country that lacks sufficient clinical training opportunities. Currently, the number of on-the-job medical training organizations in the western region is half of what is offered in China’s eastern region, leading to serious healthcare delivery problems in the country’s rural areas. Even within a single region, healthcare needs can vary.

Our Innovation Centers are helping to provide a much-needed harmonized approach to healthcare training while bolstering the skills of medical professionals.

The Medtronic Innovation Center Japan opened in Tokyo in 2017 and today serves as one of the premier physician training centers in the country. The facility features lab space, several meeting and lecture rooms as well as a showcase floor featuring Medtronic products. In 2018, the facility trained more than 5,000 healthcare professionals from throughout the Asia Pacific region.

“Our focus is on physician training but we’re also concentrating on driving innovation by collaborating with our partners throughout the region,” said Shuichi Nanikawa, director of the Innovation Center in Japan.

Among the projects taking place at the Innovation Center: the development of the first bone model used for spine and orthopedic procedures in Japan, training simulators with haptics feedback, and 3D digital tracking systems for surgical instruments.

In the future, Medtronic Innovation Center Japan and PRL plan to work together on developing models for preclinical evaluation and training opportunities.

“This is just one example of how Medtronic collaborates internally to bring better healthcare to the countries where we operate,” Courtney said. “We are benefitting from the experience our Japanese partners have in the training and education space, and they are working with us to learn about our preclinical work.”

Other Innovation Centers are tailored to suit the local needs of our healthcare partners. The Innovation Center in Sao Paulo, Brazil, for example, is the company’s first

The Medtronic Innovation Center Shanghai trained more than 6,000 healthcare professionals in 2018.

THE MEDTRONIC INNOVATION CENTER JAPAN HAS:

1. The first bone model for spine orthopedic procedures in Japan
2. Training simulators with haptics feedback
3. 3D digital tracking system for surgical instruments

>1,100 CLINICIANS AND MEDTRONIC EMPLOYEES TRAINED AT PRL IN 2019.
Center for Education and Research facility in Latin America. It is focused on giving healthcare professionals hands-on training and has one of the company’s three interactive, life-sized, touchscreen virtual anatomy tables. The Innovation Center in Istanbul, Turkey has a geographically broad reach, serving healthcare professionals in more than 30 countries.

“This is just one example of how Medtronic collaborates internally to bring better healthcare to the countries where we operate. We are benefitting from the experience our Japanese partners have in the training and education space, and they are working with us to learn about our preclinical work.”

Ian Courtney, senior director and site leader for Physiological Research Laboratories

EXTENDED REALITY IS TRANSFORMING PHYSICIAN TRAINING

Today, doctors are more likely to carry an iPad or another electronic device than they are a traditional stethoscope and satchel. Just like the way a doctor’s tools have changed, so is the way they are learning new procedures. Medtronic is using extended reality to transform medical training, giving healthcare professionals new, non-invasive ways to “see” inside the human body. We are using an experimental 3D simulator that incorporates extended reality to help train doctors implanting transcatheter pacemakers.

The extended reality feature combines real and virtual environments generated by technology and wearables to navigate inside a virtual beating heart.

Electrophysiologist Dr. George Crossley at Vanderbilt University says the technology could revolutionize training for cardiologists.

“It lets us get the trainee to a much higher level, using a simulator, than we could in a hundred cases with a live patient,” he said.

Accelerated physician training, like the kind Dr. Crossley describes, could help expand patient access to the latest therapies. And pacemaker implants are just one example of how extended reality technology is supporting medical education and training. The Medtronic Diabetes group is developing extended reality programs to help train healthcare professionals on the best way to insert glucose sensors.

Brian Gordon is a member of the Medtronic Connected Care Team within the company’s Digital Health and Extended Reality (XR) Group, which is helping business units across the organization explore the potential of augmented reality and virtual reality.

“Not only is the cost of this technology coming down, one of the huge benefits we see is its ability to help connect our partners around the world,” Gordon said. “The idea is, that someday very soon, a trainer in Arizona can teach a doctor in China in real time. That’s game changing.”

REFERENCES

6. 2019 Integrated Performance Report
7. https://pediatrics.aappublications.org/content/144/1/e20183532